Unit 1 Scientific Method and Math

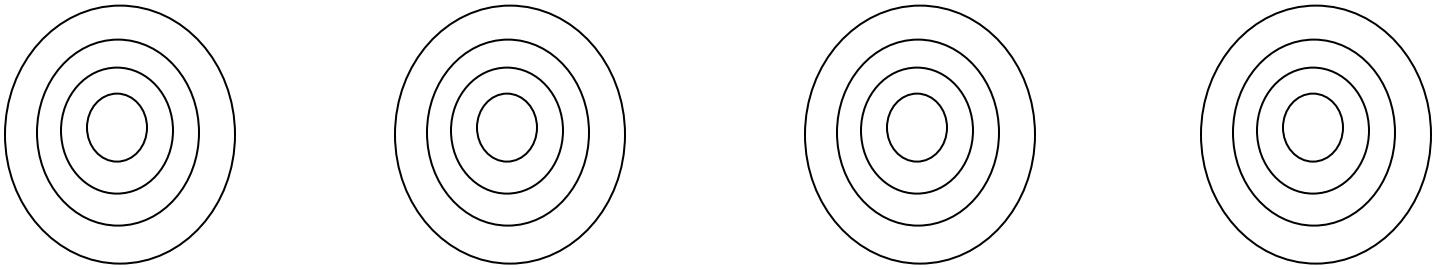
1. Convert the following using dimensional analysis
   a. 12 nm to hm

   b. 4.7×10^6 cL to dkL

   c. 3.2×10^{10} ms to hs

   d. 5.0 g to μg

2. Using the bull's eyes below show the following circumstances (make sure you label): accurate not precise, precise not accurate, accurate and precise, and neither precise nor accurate.



3. Write the following in scientific notation
   a. 17, 322, 400,000, 000,000 m
   b. 0.000000000182 L
   c. 10.5 s
   d. 0.000305 mol
4. Write the following numbers in "normal" notation (expand the values).
   a. 3.5×10^5 in
   b. 6.28375×10^{-15} mm
   c. 6.02×10^{23} particles/mol
   d. 7.4×10^{-2} dg
5. In lab, you found the mass of butane, C_4H_{10}, to be 56.6 g/mol. Calculate the percent error, if the actual mass of butane is: 58 g/mol.

6. Mr. Krabs wants to make Bakini Bottoms a nicer place to live. He has created a new sauce that he thinks will reduce the production of body gas associated with eating crabby patties from the Krusty Krab. He recruits 100 customers with a history of gas problems. He has 50 of them (Group A) eat krabby patties with the new sauce. The other 50 (Group B) eat krabby patties with sauce that looks just like the new sauce but is really just a mixture of mayonnaise and food coloring. Both groups were told that they were getting the sauce that would reduce gas production. Two hours after eating the krabby patties, 30 customers in Group A reported having fewer gas problems and 8 customers in group B reported having fewer gas problems.

   a)Which people are in the control group?

   b)What is the independent variable?

   c)What is the dependent variable?

   d)What should Mr. Krabs' conclusion be?

   e) Why do you think 8 people in group B reported feeling better?

7. In a lab experiment student D records that at 20.0°C the pressure of a sample is 4.5 atm. When she records a new temperature of 50.0°C the pressure changes to 11.0 atm. What type of relationship is she observing?

8. Draw the graph of an inverse relationship (write two variables on the axes that have an inverse relationship)

9. Name how the following pieces of lab equipment should be used in experiments.
   a. Beaker

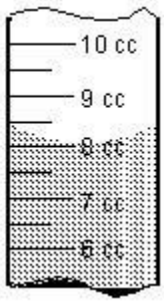
   b. Graduated Cylinder

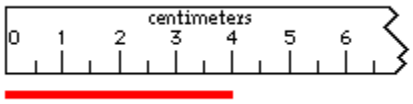
   c. Pipette

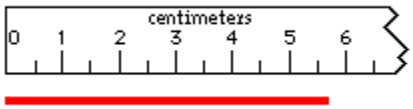
   d. Hot plate

10. Determine if the following data is Qualitative or Quantitative
    a. 12 pieces of string
    b. Blue-green precipitate
    c. Oil is less dense than water
    d. 7.2×10^{15} meters wide

11. Give the correct estimated digits for the following measurements:







12. Use the reference packet to answer the following. Show work when necessary
    a. What is the volume that 40 grams of gold would occupy?

    b. If you measured Zinc to have a volume of 36 cm^3 what would be the mass?

    c. What metal would occupy 8.3 cm^3 and have a mass of 22.4 grams?

    d. What substance is a gas at 80°C but a liquid at 75°C?
    e. What substance has a boiling point of -35°C?
    f. What substances will not form a gas?
    g. What substance has a melting point of -95°C?

13. What is the SI unit for the following:
    a. Temperature:
    b. Length:
    c. Time
    d. Amount of substance
    e. Mass

14. Name the metric prefixes in order from smallest to largest:

15. If you measured the length of a piece of metal to be 3.78 m and the measurement on the label is 4.20 m, what is the percent error?

16. A student is testing a 285 g solid with a volume of 15 cm^3. What is the density and identify of the substance? (Use your reference table to identify the substance)

17. A graduated cylinder contained 25.0 mL of water, when a block of lead is placed into the same graduated cylinder the new volume new 28.4 mL. The block has a mass 39.8 g. From this information, calculate the density of lead.

18. What volume of silver metal has a mass of 2500 g. The density of silver is 10.5 g/cm^3.

Material not in review sheet: definitions, and general safety questions.